Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

J. Hedges
U. S. HORTICULTURAL STATION
RECEIVED
★ MAR 27 1941 ★
LIBRARY
BELTSVILLE, MARYLAND

THE PLANT DISEASE BULLETIN

Issued By

THE PLANT DISEASE SURVEY

SUPPLEMENT 17

Diseases of Forest and Shade Trees, Ornamental and Miscellaneous Plants in the United States in 1920

June 15, 1921

BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

PLANT DISEASE SURVEY

1920

G. R. Lyman, Pathologist in Charge.

R. J. Haskell, Asst. Pathologist. G. H. Martin, Jr., Asst. Pathologist.

List of Collaborators of the Plant Disease Survey who have made the principal contribution to the 1920 annual Summary.

Alabama.......	Prof. A. F. Thiel
Arizona.......	Prof. J. G. Brown
Arkansas......	Dr. J. A. Elliott
	Prof. H. R. Rosen
Colorado......	Prof. C. D. Learn
Connecticut...	Dr. G. P. Clinton
Delaware......	Dr. T. F. Manns
Georgia.......	Prof. J. A. McClintock
Idaho.........	Prof. C. W. Hungerford
Illinois......	Dr. H. W. Anderson
	Dr. F. L. Stevens
	Prof. G. H. Dungan
Indiana.......	Dr. M. W. Gardner
Iowa..........	Dr. I. E. Melhus
Kansas........	Prof. L. E. Melchers
Kentucky......	Dr. W. D. Valleau
Louisiana.....	Dr. C. W. Edgerton
Maryland......	Prof. C. E. Temple
Massachusetts.	Prof. A. V. Osmun
	Mr. W. S. Krout
Michigan......	Dr. E. A. Bessey
	Dr. G. H. Coons
	Mr. Ray Nelson
Minnesota.....	Dr. E. C. Stakman
	Prof. J. G. Leach
Mississippi...	Prof. D. C. Neal
Missouri......	Dr. E. F. Hopkins
Montana.......	Prof. D. B. Swingle
	Dr. H. M. Jennison
Nebraska......	Prof. R. W. Goss
Nevada........	Prof. C. W. Lantz
New Hampshire..	Dr. O. R. Butler
New Jersey.....	Dr. M. T. Cook
New York.......	Dr. Chas. Chupp
North Carolina.	Dr. R. A. Jehle
North Dakota...	Prof. H. L. Bolley
	Dr. Wanda Weniger
Ohio...........	Prof. A. D. Selby
	Mr. R. C. Thomas
Oregon.........	Prof. H. P. Barss
	Prof. C. R. Orton
Pennsylvania...	Prof. H. W. Thurston
Porto Rico.....	Mr. Julius Matz
South Dakota...	Dr. Arthur T. Evans
Tennessee......	Prof. S. H. Essary
	Dr. L. R. Hesler
	Prof. C. D. Sherbakoff
Texas..........	Dr. J. J. Taubenhaus
Utah...........	Dr. B. L. Richards
Vermont........	Dr. B. F. Lutman
	Prof. A. H. Gilbert
Virginia.......	Dr. F. D. Fromme
Washington.....	Dr. F. D. Heald
	Mr. B. F. Dana
	Mr. A. M. Frank
West Virginia..	Dr. N. J. Giddings
	Prof. Anthony Berg
	Dr. J. L. Sheldon
Wisconsin......	Dr. R. E. Vaughan

DISEASES OF FOREST AND SHADE TREES, ORNAMENTAL AND MISCELLANEOUS PLANTS IN THE UNITED STATES IN 1920

Prepared by
G. Hamilton Martin, Jr.

CONTENTS

Diseases of forest, shade and ornamental trees.............. 289
Diseases of ornamental shrubs and plants.................. 301
Diseases of miscellaneous plants . 308
Status of white pine blister rust control in 1920-21..............316-a
Preliminary list of publications on diseases of forest, shade and ornamental trees and shrubs 316-f

Foreword

The summary of the diseases of forest and shade trees, ornamental and miscellaneous plants has been prepared by utilizing the following sources of information: (1) collaborators (2) specialists in the offices of Forest Pathology and Blister Rust Control (3) articles in botanical journals, and (4) special reporters. Initials in place of the full name have been used in a considerable number of cases to indicate the person furnishing the reports. These are as follows:

T. D. B. = Thomas D. Burleigh, University of Georgia, Athens.
J. F. C. = J. Franklin Collins, Office of Forest Pathology, Providence, R.I.
A. O. G. = A. O. Garrett, Smuts and Rusts of Utah, IV, Mycology 13: 101.
A. G. H. = A. G. Henn, City Forester, Mt. Vernon, New York.
L. C. M. = L. C. Miller.
W. A. M. = W. A. Murrill, The Fungi of Blacksburg, Virginia, Mycology 12:322.
J. L. S. = John L. Sheldon, Morgantown, West Virginia.

Due to the greater attention which should be given to the reporting of the diseases of forest, shade and ornamental trees, shrubs and miscellaneous plants, letters were addressed to a considerable number of foresters and other workers to see if they were interested in tree diseases and willing to cooperate in securing information on that subject. A favorable, and in many cases enthusiastic, response was received from a large number of those addressed, which indicated the need for further information of this kind. It is hoped that the interest created in this subject may continue to increase and develop as there is a growing realization of the value of our trees and ornamental plants, and of the necessity for protecting them from the ravages of disease.

The special write-up on the status of the white pine blister rust control in 1920-21 has been featured at the close of this summary due to the importance which is felt should be shown it.

There has been a demand for references by tree workers for Government and state publications as well as association lists and books which deal with the diseases of forest, shade and ornamental trees, shrubs and plants. Thus the preliminary list of recent publications which is appended to the summary.

ACACIA (Acacia sp.)

Pink disease caused by Corticium salmonicolor B. & Br. reported from Philippine Islands (serious. H. A. L.).

AM~~A~~ELANCHIER (Am~~a~~elanchier spp.)

Rust caused by Gymnosporangium inconspicuum Kern reported from Utah (on A. jonesiana, Iron Co., July 29; on A. prunifolia, Washington Co., July 22; on A. utahensis, Iron Co., July 16, Washington Co., July 22, Millard Co., Aug. 7 A.O.G.).

Rust caused by Gymnosporangium nelsoni Arth. reported from Utah (on A. jonesiana, Iron Co., July 19; on A. mormonica, Beaver Co., Aug. 3; A. polycarpa, Iron Co., July 17; A.O.G.).

Rust caused by Gymnosporangium juvenescens Kern reported from Utah (A. oreophila, Piute Co., June 28, A.O.G.).

ARBOR VITAE (Thuja sp.)

Leaf blight caused by Keithia thujina Durand reported from Virginia (Richmond, Henrico County, Nov. 1, produced defoliation).

Blight caused by Pestallozia conigena Lev. reported from Minnesota (Minneapolis, Hennepin Co., Aug. 1. Not important, local).

Blight caused by ~~Pestallozia~~+ funerea Desm. present in Virginia (J.F.C.).

Winter injury reported from Ohio (reported from widely scattered counties throughout the state,- Athens, Wayne, Williams and Wood. Frequent sleets with changing temperatures were responsible; mulching has been suggested as a possible treatment).

Blight, cause undetermined, reported from Texas (specimens and reports were received from Dallas concerning a blight which has been attacking at least 10% of the trees and eventually killing many of the finest arbor vitae in this city - upon examination a fungus (Diplodia sp.) was found which may be causing the trouble or acting as a secondary cause).

ASH (Fraxinus spp.)

Anthracnose caused by Gloeosporium aridum Ell. & Holw. reported from Massachusetts (on F. americana, J.F.C.); District of Columbia (on F. americana, J.F.C.); Virginia, and Ohio (Butler and Wayne Counties, especially severe on young trees, the abundant rainfall and relatively high temperature promoting a favorable disease condition; Bordeaux mixture is suggested as a treatment. June 4).

Leaf and twig rust caused by Puccinia fraxinata (Lk.) Arth., reported from Massachusetts (on F. americana, J.F.C.); Connecticut (Hartford County - average amount less prevalent than in preceding year); Indiana (F. viridis, J.F.C.); Minnesota (Pipestone and Wabash Counties, June 23).

Witches' broom caused by Taphrina cerasi (Fcl.) Sad. (Exoascus cerasi), reported from Ohio.

Leaf spot caused by Phyllosticta viridis E. & K. reported from Minnesota (on F. americana, Washington County, Aug. 11.).

Leaf spot caused by meteorological conditions reported from Connecticut (Windham County).

+ Pestallozzia

ASH, Mountain (Sorbus americana)

Canker caused by Nummularia discreta (Schw.) Tul. reported from Minnesota (Olmstead and Rochester Counties July 14, unimportant).

Scab caused by Venturia inaequalis (Cke.) Aderh. reported from Minnesota (unimportant).

Winter injury reported from Washington (Lincoln Co.).

BASSWOOD (Tilia sp.)

Leaf spot caused by Gloeosporium sp., reported from Minnesota (Wabasha Co., June 28).

BEACH (Fagus americana)

Coriolus nigromarginatus (Schw.) Murr. (Polyporus hirsutus Fries) (Polystictus hirtellus Fries) reported from Georgia (collected at Athens. T.D.B.)

BIRCH (Betula sp.)

Leaf spot caused by Septoria betulae (Lib.) Westd. reported from Minnesota (Fairmont and Martin Counties, Aug. 7).

Leptothyrium sp. reported from New York. (J.F.C.)

BUCKEYE (Aesculus glabra)

Leaf blotch caused by Guignardia aesculi (Pk.) Stewart (Phyllosticta paviae Desm.) (P. sphaeropsidea E. & E.) reported from Ohio (Cuyahoga, Knox, Lake, Morrow and Wayne Counties - more prevalent than in previous years - favorable weather conditions existed).

BUCKTHORN (Rhamnus sp.)

Rust caused by Puccinia coronata Cda., (Ae. rhamni) reported from Tennessee (on R. caroliniana) and Minnesota (moderately severe in Rice and Waseca Counties, slight in Dodge and Ramsey Counties, May 22).

BUTTERNUT (Juglans cinerea)

Anthracnose caused by Gnomonia leptostyla (Fr.) Ces. & d. Not. (Marssonia juglandis) reported from West Virginia (Morgantown, Monongalia County, found on some small trees two to five feet in height which were growing on a shaded bank), Iowa (about 90% of the trees were infested, producing about a 10% reduction in yield).

CAMPHOR (Cinnamomum camphora)

Anthracnose caused by Gloeosporium camphorae Sacc. reported from Texas (Bell Co., a trace only).

Canker, caused by Diplodia sp. reported from Texas (Harris Co., unimportant).

CATALPA (Catalpa sp.)

Leaf spot caused by Alternaria catalpae reported from New York (Cayuga, Monroe and Suffolk Counties, Aug. 2 at Auburn). Alternaria sp. reported from Ohio (Stark and Wyandot Counties, Aug. 31, more prevalent than in 1919.

Leaf spot caused by Phyllosticta catalpae E. & M. reported from New

Jersey (found throughout the state, causing heavy leaf fall at times - more serious on some individuals than on others), Ohio (Cuyahoga, Portage and Summit Counties, Aug. 18, prevalence general), and Missouri (Boone and Buchanan Counties). Phyllosticta sp. reported from New York (Lockport, Niagara Co., Aug. 19, unimportant).

A leaf spot caused probably by Macrosporium catalpae E. & M. reported from West Virginia (very destructive to some trees in a planting near Westover, Monongalia Co.; certain trees of C. bungei at Morgantown were also attacked).

Powdery mildew caused by Microsphaeria alni var. vaccinii (Schw.) Salm. (M. elevata Burr.) reported from West Virginia (found in small amounts on C. bungei at Morgantown, Monongalia Co.)

Heart rot caused by Polystictus versicolor Fries. reported from Ohio.

Sap rot caused by Stereum versicolor Fries. reported from Ohio.

Leaf wilt caused by Sclerotinia sp. reported from Ohio (Cuyahoga County, April 3,- of more than usual prevalence).

Wilt, cause undetermined, produced some loss in northern Indiana and Ohio. No cankers nor discolorations were found on the affected branches or any of its wood. According to D. C. Babcock the trees die back, death starting at the tip of the branches. So far no effect has been found on the roots.

Leaf spot, cause undetermined, was reported from New Jersey (J.F.C.) and West Virginia (first noticed on C. bignonioides by John L. Sheldon; on July 27 he found it abundant and very destructive on trees of C. bungei which were growing in several lawns about Morgantown, -- has been present in this locality for several years but not until 1920 was it definitely decided that the disease was caused by a specific fungus). A leaf spot reported also from Michigan.

CHESTNUT (Castanea dentata)

Blight caused by Endothia parasitica (Murr.) Aud. (prepared by G. F. Gravatt, Office of Forest Pathology).

> "In New England the blight is now found everywhere that the native chestnut occurs in any quantity. In the western parts of New York and Pennsylvania, the disease is reported as present in all chestnut counties but the percent of trees infected is low. The blight was reported as present in Lake County, Ohio.
>
> "On a brief inspection trip the blight was found in eight new counties in West Virginia, making a total of 17 counties in the northeast quarter of that state which are now infected. In the southwest part of Virginia the disease was noted in three new counties,- Giles, Pulaski and Floyd. In the northwestern corner of North Carolina, the blight was found in seven new counties. The above noted infections show that the disease is steadily spreading southward and less rapidly westward through the Southern Appalachians. Where the disease has been present for considerable time such as in New Jersey, around New York City and in eastern Pennsylvania, less than 1% of the original trees are now alive."

Reported to the Plant Disease Survey from Maine, New York, New Jersey, Pennsylvania, West Virginia, Virginia and Ohio.

Leaf spot caused by Marssonia ochroleuca B. & C. reported from West Virginia (Morgantown, Monongalia Co., found on a few trees - first report to the Plant Disease Survey), Ohio (Athens Co., less prevalent than in 1919 - weather conditions were unfavorable due to low temperature and delayed development).

Late flowering was reported from West Virginia (Morgantown - John L. Sheldon reported seeing a large tree in full bloom on Oct. 2 - a short time before rubbish had been burned - he also noticed a few burs that had opened from which the chestnuts had fallen out. These were the fruits of the spring blooms).

CHOKE CHERRY (Prunus sp.)

Black knot caused by Plowrightia morbosa (Schw.) Sacc., reported from Minnesota (on P. serotina Kittson Co. Aug. 26; on P. virginiana Goodhue and Ramsey Counties May 16). Plowrightia sp. reported from Washington.

Powdery mildew caused by Podosphaera oxyacanthae var. tridactyla (Wallr.) Salm., reported from Minnesota (Pennington Co., Aug. 28).

Leaf spot caused by Coccomyces lutescens Higg., reported from Washington (on P. demissa, Whitman Co.).

Sclerotinia sp. reported from Washington (on P. demissa, Whitman Co.).

Coriolus sericeohirsutus (Klotzsch) Murr. reported from Georgia (at Athens T.D.B.).

DOGWOOD (Cornus sp.)

Powdery mildew caused by Phyllactinia corylea (Pers.) Karst., reported from Washington (Whitman Co.).

Tubercularia sp. reported from District of Columbia (on Cornus macrophylla. J.F.C.)

Leaf spot caused by Septoria sp. reported from District of Columbia and Minnesota (Hennepin Co., Aug. 18).

ELDER (Sambucus canadensis)

Powdery mildew caused by Microsphaera grossulariae (Wallr.) Lev. reported from West Virginia (Morgantown, Monongalia Co.)

ELM (Ulmus americana)

White elm canker caused by Sphaeropsis sp. on Ulmus americana. (Prepared E. E. Hubert, Office Forest Pathology).

> "A canker of the white elm (Ulmus americana) was investigated in Madison, Wisconsin during 1920. The disease was found to be widespread in Madison and vicinity and considerable damage and death to shade and ornamental elms as well as to nursery stock was evident. Dr. Fracker, State Entomologist of Wisconsin has reported that an elm disease which appears to be the same as the one herein mentioned has been under observation for the past five years and has been reported as occurring in practically every nursery in the state in which white elms are grown. Reports have not been received from other states. Reports of somewhat similar diseases, Sphaerop-

sis conglobata Sacc. on birch and *Sphaeropsis malorum* Berk. on oaks are on record.

"The cankers appearing on white elm branches resemble very closely those caused by *Sphaeropsis malorum* Pk. on branches and trunks of apple, pear and quince trees. The fungus in the infected branches of elm spreads from the main branch to the laterals and eventually a 'stag-head' appearance characterizes the infected trees.

"Trees up to six inches in diameter have gradually died, the infection progressing from the tip of the branch until it pervades the entire tree. The roots remain living until the last and often send up sprouts after the top of the tree is dead.

"Observations and cultural experiments point to the fungus, *Sphaeropsis ulmicola* E. & E. as the causal organism. Pure cultures of the fungus when inoculated into fresh apples have produced symptoms resembling closely those produced by *S. malorum*."

ELM (Ulmus spp.)

Leaf spot, black spot, anthracnose, or leaf scab caused by *Gnomonia ulmea* (Schw.) Thüm (Dothidella ulmea (Schw.) E. & E.) (*Gloeosporium ulmeum* Miles) (*Systremma ulmi* (Schleich.) Thiess. & Syd.) reported from Connecticut (New London Co., Aug. 26, more prevalent than in 1919), New Jersey (J.F.C.), Tennessee (J.F.C.), Ohio (Butler Co., May 31, more prevalent than in 1919), and Minnesota (Anoka, Benton, Pine, Rice, Roseau and Wadena Counties, June 27). Also present in the following states according to L. C. Miles: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, New York, Pennsylvania, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Texas, Ohio, Indiana, Illinois, Michigan, Wisconsin, Iowa, Missouri, North Dakota, South Dakota, and Nebraska. He also states that it has not been seen on any European or other foreign elm, however, collected in this country or abroad, nor is there any account of its occurrence on such. The leaf spot caused by *Gnomonia ulmea* (Schw.) Thüm is often reported under the name of *Systremma ulmi* (Schleich.) Thiess and Syd., but the true *S. ulmea* occurs only in Europe. *Gnomonia ulmea* has been reported in the United States on the following elm species: wing elm (*U. alata*), white elm (*U. americana*), cedar elm (*U. crassifolia*), slippery elm (*U. pubescens* = *U. fulva*), cork elm (*U. racemosa*), red elm (*U. serotina*).

Leaf spot caused by *Mycosphaerella ulmi* Kleb. (*Phleospora ulmi* (Fr.) Wallr.) (*Septoria ulmi* Fr.) (*Cylindrosporium ulmicolum* E. & E.) (*Septogloeum ulmi* (Fr.) Bri. & Cav.), present in New York (in the conidial stage it is said sometimes to do considerable damage to nursery stock and young trees - Stewart states that, according to L. C. Miles, it has been observed several times to cause extensive defoliation of young elms in New York, L.C.M.), Mississippi (on leaves of *U. alata*, L.C.M.). It has also been reported found on *Ulmus campestris*, *U. glabra* and *U. americana*.

Leaf spot caused by *Septogloeum profusum* (E. & E.) Sacc. has been reported on wing leaves of *Ulmus alata* and *U. americana*, L.C.M.

Leaf spot caused by *Ceratophorum ulmicolum* Ell. & Hark. (on living leaves of *Ulmus pubescens*, noted from several places in the United States, L.C.M.).

Leaf spot caused by *Coryneum tumoricolum* Peck. present in New York (on living leaves of *Ulmus americana* in the Adirondack Mountains L.C.M.).

Leaf spot caused by Excipula ulmicola Schw. present in Pennsylvania (reported as somewhat rare on cast-off leaves of Ulmus pubescens = U. fulva about Bethlehem, L.C.M.).

Leaf spot caused by Gloeosporium ulmicolum Miles, present in Wisconsin (Oconomowoc, Aug. 22, 1919, habitat on living leaves of U. americana L.C.M.).

Melasmia ulmicola B. & C., present in New Jersey (Cook speaks of it as the Melasmia stage of Rhytisma ulmi and reports it as very common in New Jersey, L.C.M.).

Rhytisma ulmi Fr. present in North America (reported on leaves of Ulmus in North America L.C.M.)

Phoma cincta B. & C. present in South Carolina (reported on leaves of U. americana in South Carolina L.C.M.)

Phyllosticta confertissima E. & E. present in Kansas (on leaves of U. pubescens = U. fulva in Kansas L.C.M.)

Phyllosticta ulmicola Sacc. present in Michigan (on Ulmus pubescens (U. fulva) L.C.M. and Wisconsin (on Ulmus americana & U. racemosa, Tisch Mills, Aug. 3, 1917).

Sphaeria apertiuscula Schw. present in New York (recorded as occurring on the lower side of leaves of Ulmus pubescens (U. fulva) L.C.M.

Root rot caused by Ozonium omnivorum Shear., reported from Texas (Bell, Burleson, Dallas, Denton, and Falls Counties - the elm is fairly resistant to the root rot which accounts for the disease being so far unimportant in the state).

Heart rot caused by Coriolopsis occidentalis (Klotsch.) Murr. (Polyporus occidentalis Klotsch.) reported from Ohio (Medina Co., Mar. 20).

Brown wood rot caused by Pleurotus ulmarius Bul. reported from Ohio (Lorain and Wayne Counties, Mar. 20).

Leaf burning, cause questioned, reported from Michigan (Iron Co.).

EUCALYPTUS (Eucalyptus diversicolor)

Botrytis sp. reported from California. (J.F.C.)

HACKBERRY (Celtis sp.)

Leaf spot caused by Phyllosticta celtidis Ell. & Kell., reported from Minnesota (Hennepin Co., Aug. 24).

Witches broom caused by Phytoptus sp. reported from West Virginia (Morgantown, Monongalia Co., scarcely a tree that was not badly infested).

HAWTHORNE (Crataegus sp.)

Rust caused by Gymnosporangium globosum Farl., reported from Michigan (Kent Co.).

HAZLENUT (Corylus sp.)

Leaf spot caused by Gnomoniella coryli (Batsch.) Sacc. reported from Minnesota (Marshall Co., July 26).

HEMLOCK (Tsuga sp.)

Stysamus (stemonites ?) reported from West Virginia. (J.F.C.)

HICKORY (Carya sp.)

Witches' broom caused by Microstroma juglandis (Ber.) Sacc. reported from West Virginia (Morgantown, Monongalia Co., while the brooms were not as conspicuous as those reported for the white oak, they were more plentiful and the destructive effect was more pronounced. J.L.S.)

Anthracnose, cause questioned as to whether it was Marssonia sp. or Gnomonia caryae Wolf (Gloeosporium caryae) reported from West Virginia.

Hexagona alveolaris (DC.) Murr. reported from Virginia:

> "Found during the latter half of July by writer. Common on fallen hickory branches. H. striatula was also common on the same host but not on the same actual branch. I think it is undoubtedly only a variety of H. alveolaris. In Europe, this species causes a serious disease of the English walnut and we must be prepared to expect it in our walnut and hickory orchards in this country." (W. A. Murrill)

HORSE CHESTNUT (Aesculus hippocastanum)

Leaf blotch caused by Guignardia aesculi (Pk.) Stewart, (Phyllosticta paviae Desm.) (P. sphaeropsidea E. & E.) reported from Maine (J.F.C.), New York (very severe, affecting 75% of the trees in the state, producing defoliation and a weakened condition of the tree. A. G. Henn, city forester at Mt. Vernon, reported that the trees in his city suffered from leaf spot and drop by mid-summer, a large percentage of their leaves being lost), New Jersey, Ohio (Warren Co., June 24), Michigan (Oakland Co.). Nectria canker (Nectria cinnabarina (Tode.) Fr. very often follows leaf blotch, causing the trees to die.

JUNEBERRY (Amelanchier sp.)

Powdery mildew caused by Podosphaera oxyacanthae (DC.) De Bary, reported from Minnesota (Roseau Co., Aug. 25).

Brown rot caused by Sclerotinia fructigena (Pers.) Schw. reported from Ohio. Sclerotinia sp. reported from Washington (Whitman Co.).

JUNIPER (Juniperus spp.)

Rusts caused by Gymnosporangium spp.:

- Gymnosporangium juniperi-virginianae Schw. (G. macropus Lk.) reported from New Jersey (Burlington, Cape May and Monmouth Counties), Ohio (throughout the southern counties and up the Ohio River as far as Belmont Co.), Minnesota (the southeastern part of the state, more than in 1919 - see also apple rust in Pl. Dis. Sup. 14, Apr. 1, 1921).
- Gymnosporangium clavariaeforme Jacq. reported from Michigan (Ingham Co.).
- Gymnosporangium globosum Farl. reported from New York (Tanghannock Falls, Tompkins Co., June 5 - probably of greater distribution than reports indicate.

Gymnosporangium germinale (Schw.) Kern. reported from New York.

Gymnosporangium juniperinum (L.) Mart. reported from Utah (on J. siberica, Piute Co., June 28 - this is the first collection of this rust reported from Utah. A.O.G.)

Gymnosporangium juvenescens Kern, reported from Utah (on J. scopulorum, Iron Co., July 19. A.O.G.)

Gymnosporangium inconspicuum Kern. reported from Utah (on J. utahensis (Engelm.) Lemmon, Iron Co., July 17. A.O.G.)

Gymnosporangium nelsoni Arth. reported from Utah (on J. scopulorum Utah Co., June 23, Iron Co., July 17; on J. utahensis (Engelm.) Lemmon, San Pete Co., June 25, Garfield Co., Iron Co. A.O.G.)

Blight caused by Sphaeropsis (juniperi ?) reported from New York. (J.F.C.)

Winter injury caused by meteorological conditions. (Prepared by G. F. Gravatt, Office Forest Pathology):

> "In a zone extending from northern Virginia to a little north of New York City, winter injury to evergreens was very severe. In the District of Columbia and nearby territory many large native red cedars, Juniperus virginiana, some of which were nearly a hundred years old, were killed. In some localities up to 25% of these trees were completely killed. Planted conifers suffered severely, the damage varying from the partial loss of the needles to complete death. The pines were the least affected of this class. In addition to variations in damage according to species, variety, and exposure, there was considerable individual variation. Thus some of the trees in a row of the same species were killed while others of the same species growing under the same conditions were uninjured."

LINDEN, European (Tilia sp.)

Leaf scorch caused by meteorological conditions reported from New York (Mt. Vernon. A.G.H.).

LOCUST, black (Robinia pseudacacia)

Rot caused by Polyporus ~~glivus~~ Gilvus Fr. reported from West Virginia (large sporophore found growing out of a knot hole in a live tree at Morgantown. J.L.S.)

Heart rot caused by Polyporus rimosus B. (Fomes rimosus Cke.) reported from West Virginia.

Witches' broom cause unknown, reported from West Virginia.

Late flowering reported from West Virginia (noted at Morgantown on a tree that had lost its leaves early but about the first of October continued to bloom for several weeks. J.L.S.).

MAPLE (Acer spp.)

Leaf spot caused by Gloeosporium decolorans Ell. & Ev. on A. rubrum, reported from New York (J.F.C.); G. (oblongisporum ?), on A. saccharinum reported from Arkansas (J.F.C.), and G. apocryptum Ell. & Ev. on A. sp. reported from Ohio (Marion and Wayne Counties, June 30), and G. sp. from Michigan (Calhoun Co.)

Leaf spot caused by Phyllosticta minima (B. & C.) E.& E., (P. acericola C. & E.) reported from West Virginia (on A. rubrum, Dellslow and Westover), Tennessee (on A. saccharinum; P. sp. questioned. J.F.C.), Ohio (on A. sp. Fairchild and Stark Counties, normal amount of prevalence, July 31).

Leaf spot caused by Phyllosticta aceris Sacc. reported from Minnesota (Brown and Isanti Counties, July 24).

Tar leaf spot caused by Rhytisma acerinum Fries., reported from Massachusetts (J.F.C.), New York (on A. negundo, A. rubrum, A. saccharinum, Greene, Monroe, Montgomery and Tompkins Counties, Aug. 19 - rather common during 1919 in nearly all places in the state where maples are grown - no damage done), New Jersey (rarely found), Ohio (Belmont, Clermont, Cuyahoga, Sciotc and Wayne Counties, June 11, more prevalent than in previous years), Minnesota (Dodge, Filmore, Hennepin, Lesueur, Lyon, Martin, Wilkin, Rice, and Stearns Counties, July 24.)

Black speck leaf spot caused by Rhytisma punctatum Fries, reported from New York (on A. spicatum, Tompkins Co., July, collected several times) and Minnesota (Itasca Co., Sept. 3).

Wilt caused by Verticillium sp. reported from Virginia (Lynchburg, Campbell Co., found on a single tree of Norway maple (A. platanoides) fifteen years old). This is a disease of which little is known so far in the United States. It has been reported in North America only from New York, District of Columbia, and Virginia, in the United States, and from Ontario, Canada. In order to keep a close watch for its appearance a few salient points as to its appearance might be worth while here. The external symptom is a blanching and quick wilting of the leaves during the middle of the summer, and the foliage on a branch or the entire side of the tree may suddenly appear scorched. On examining the sapwood of the affected part of the tree, streaks of longitudinal lines of greenish color will be found in the outer layers. This discoloration may extend upward or downward and may even enter the roots.

Steganosporium piriforme (Hoff.) Cord. reported from District of Columbia and Virginia (Acer (platanoides ?) J.F.C.).

Rot caused by Stereum versicolor (Lev.) Fr. reported from Georgia (on A. negundo at Athens. T.D.B.).

White butt rot caused by Fomes applanatus Fries. reported from Connecticut (Litchfield Co., on living tree, causes an injury to the heartwood).

Root rot caused by Armillaria mellea (Vahl.) Quel. reported from New York (on A. saccharum , Monroe Co., Sept. 13).

Leaf scorch (non-parasitic) reported from Connecticut (Fairfield and Windham Counties, July 12), New York (Cayuga, Erie, Long Island, Schenectady, Tompkins and Wayne Counties, July 10, rather common, produced a weakened condition of the tree, more prevalent in the Hudson Valley and along the Lake regions than in other parts of the state, period of greatest injury during dry spells of July and August).

Winter injury (non-parasitic) occurred in Ohio (Ashtabula, Rike and Tuscarawas Counties, June 15 - ice sheets and low temperature furnished favorable conditions.

OAK, white (Quercus alba)

Leaf spot caused by Gnomonia veneta (Sacc. & Speg.) Klebahn., reported from Iowa (more prevalent than in 1919, affected about 8% of the trees in the state).

Pestalozzia monochaete Desm. (P. peckii Clinton) reported from Rhode Island (J.F.C.).

Leaf blister caused by Taphrina coerulescens (Mont. and Desm.)

Tulasne, occurred in Rhode Island (J.F.C.) and New York (Orange and Tompkins Counties, July 26 - not important).

Anthracnose caused by Gloeosporium canadense Ell. & Ev. occurred in Rhode Island (J.F.C.) and Connecticut (New Haven Co.).

Gloeosporium quercinum West. reported from Tennessee. (J.F.C.)

Twig blight caused by Sphaeropsis (malorum ?) occurred in Virginia. (J.F.C.)

Witches' broom caused by Microstroma album (Desm.) Sacc. present in West Virginia. Quoting from John L. Sheldon

> "I have watched a tree in a pasture near Morgantown for years, from the time the brooms were only a foot or two tall. Now two of the brooms must be at least five feet tall, being very compact and symmetrical. Last year I succeeded in collecting leaves which contained the fungus."

OAK, scarlet (Quercus coccinea)

Bulgaria polymorpha (Oed.) Wett. present in New York. (J.F.C.)

OAK, water (Quercus nigra)

Cerrena unicolor (Bull.) Murr. occurred in Georgia (Athens. T.D.B.).

OAK, chestnut (Quercus prinus)

Leaf spot caused by Marssonia sp. present in West Virginia (Morgantown, Monongalia Co., in small amounts on young growth. J.L.S.).

Twig blight caused by Sphaeropsis malorum Berk. (Physalospora cydoniae Arnaud) or Diplodia longispora C. & Ell. (Prepared by G. F. Gravatt, Office of Forest Pathology):

> "Twig blight caused by Pysalospora cydoniae or Diplodia longispora was very prevalent in Maryland, District of Columbia, West Virginia, Virginia, North Carolina and parts of Tennessee during 1920. Some large chestnut oaks were apparently dying from the cumulative effects of this disease. Twigs and limbs on small trees were killed but new growth was putting out further back. The fungus was collected on various other forest trees but seems to be of practical importance chiefly on the chestnut oak.
>
> "This disease has been very much more prevalent in Virginia during the past two years than during the preceding six or eight years. Its irregular distribution and rapid increase during recent years leads one to think that at least this strain of the fungus is not native to the Southern Appalachians."

OAK, English (Quercus robur)

Canker caused by Cytospora chrysosperma (P.) Fr. present in Rhode Island. (J.F.C.)

OAK, red (Quercus rubra)

Leaf spot caused by Septoria quercicola Sacc. reported from Minnesota

(St. Paul, Ramsey Co., Aug. 1 - unimportant).

Lactiporus speciosus (Batt.) Murr. (L. sulphureus) reported from Georgia (found at Athens). (T.D.B.)

OAK (Quercus spp.)

Anthracnose caused by Gnomonia veneta (S. & S.) Kleb., (Gloeosporium nervisequum (Fckl.)) reported from Ohio (Hamilton Co., Aug. 21).

Leaf spot caused by Gloeosporium sp. reported from Michigan (Isabella Co.).

Powdery mildew caused by Microsphaera alni (Wallr.) Salm. reported from Ohio (Morgan, Muskingum, Scioto, and Wayne Counties).

Nummularia billiardi Tul. present in Virginia. (J.F.C.)

OSAGE ORANGE (Maclura aurantiaca)

Blight caused supposedly by bacteria, reported from Tennessee (a case was observed at Columbia; resembled fire blight but it is not now suggested that it was due to fire blight. L. R. Hesler).

PINE, short leaf (Pinus echinata)

Coriolus versicolor (L.) Quel. (Polyporus versicolor Fr.) reported from Ga. Athens. T.D.B.)

PINE, piñon (Pinus edulis)

Rust caused by Cronartium occidentale (Hedgec.) Bethel and Hunt, occurred in Utah (Iron and Piute Counties, June 27. A.O.G.).

PINE, rock (Pinus ponderosa scopulorum)

Rust caused by Cronartium filamentosum (Peck) Hedgec. and Long (Peridermium filamentosum Peck) occurred in Utah (Garfield Co., July 1, first record of this Peridermium in Utah. A.O.G.).

Rust caused by Cronartium pyriforme (Peck) I. Hedgec. and Long (C. comandrae Pk.) (Peridermium pyriforme Pk.) occurred in Utah Wasatch Co., July 15, first report of this Peridermium in Utah although the Cronartium has previously been reported from several localties. A.O.G.)

PINE, eastern white (Pinus strobus)

Caliciopsis pinae Pk. occurred in Maine. (J.F.C.)

Capnodium pini B. & C. reported from Connecticut (Litchfield Co., Oct. 29, unimportant).

PINE, Scotch (Pinus sylvestris)

Colletotrichum sp. reported from Michigan (Lawrence Co., Sept. 27 - Bordeaux spray was used with promising results).

PINE (Pinus spp.)

A physiological blight reported from Connecticut (Hartford and Kensington Counties, July 3 - one report).

Canker, cause unknown, reported from Michigan (Ingram Co.).

POPLAR (Populus sp.)

Leaf drop, cause unknown, reported from New York (Mt. Vernon, A.G.H.).

PSEUDOTSUGA MUCRONATA

Rust caused by Melampsora albertensis Arth. I. (Caeoma occidentalis Arth.) occurred in Utah (Iron Co., July 27 - this is the first recorded collection of this Caeoma for Utah although the Melampsora on Populus tremuloides has been reported from San Juan Co. A.O.G.).

SERVICE BERRY (see Juneberry)

SEQUOIA (Sequoia washingtoniana)

Seedling rot caused by Botrytis douglasii Tub. reported from Ohio.

SPRUCE, Engelmann (Picea engelmanni)

Rust caused by Peridermium coloradense (Dietel) Arth. and Kern. occurred in Utah (Iron Co., July 9 A.O.G.).

SPRUCE (Picea sp.)

Leaf scorch caused by meteorological conditions reported from New York (probably more prevalent than in 1919, occurred all over the state but especially in the Hudson Valley, where it is reported mostly by owners of large estates.

TULIP POPLAR (Liriodendron tulipifera)

Powdery mildew causal organism not given - reported from Ohio.

SYCAMORE (Platanus occidentalis)

Anthracnose caused by Gnomonia veneta (Sacc. & Speg.) Klebahn. (Gloeosporium nervisequum (Fcl.) Sacc.) reported from New York (Mount Vernon - spraying with Bordeaux was tried, and although it helped a little the result was not wholly satisfactory, A.G.H.), New Jersey (throughout the state, very abundant), West Virginia (much less in the vicinity of Morgantown than in 1919, J.L.S.), Arkansas (throughout the northeastern part of the state, less severe than usual, about 75% of the trees were affected - April), Ohio (abundant around Cincinnati C.M.S.), and Iowa (common, only a trace of loss).

Powdery mildew, causal organism not given, reported from Virginia (Hilton Village, caused severe defoliation on one year old trees in streets, Sept. 17).

Root rot caused by Armillaria mellea (Vahl.) Quel. reported from West Virginia, J.L.S.).

UMBRELLA TREE (Melia sp.)

Texas root rot caused by Ozonium omnivorum Shear reported from Texas (Bell, Brazos, Falls and Harrison Counties - prevalent, important as a disease of ornamentals, causes total destruction of trees, found throughout state wherever cotton dies from root rot in wax-clay soils, attacks the host in all stages - very wet weather conditions during the year).

WALNUT (Juglans sp.)

Leaf spot caused by Marssonia juglandis (Lib.) Sacc. reported from West Virginia (a small amount on young trees growing in shaded places near Morgantown, Monongalia Co. J.L.S.).

Scab caused by Cladosporium juglandis reported from Minnesota (Invergrove, Dakota Co., July 28 - unimportant).

Crown gall caused by Bacterium tumefaciens Sm. and Town. reported from Pennsylvania. (J.F.C.)

Dying back caused by frost reported from Michigan (Kent Co.).

Frost injury reported from Washington (King Co.).

Winter injury reported from Ohio (Cuyahoga and Wood Counties, July 19, more prevalent than in previous year - ice and freezing important in producing the diseased condition) and Washington (Clark and Cowlitz Counties).

WILLOW, Watson's (Salix watsonii)

Rust caused by Melampsora confluens (Pers.) Jackson (Caeoma confluens (Pers.) Schröt.) reported from Utah (Summit Co., June 21).

WILLOW (Salix spp.)

Powdery mildew caused by Uncinula salicis (D.C.) Wint., reported from Ohio, Minnesota (Lancaster, Aug. 24, general throughout the state, unimportant) and Iowa (common, about 2% infection, trace of loss).

Rust caused by Melampsora bigelowii Thüm reported from Minnesota (Bemidji, Aug. 5, general throughout the state - unimportant), Iowa (common, about 15% infestation, trace of loss), and Washington (Whitman Co.).

Rust caused by Melampsora sp. reported from West Virginia (Monongalia Co.).

Tar spot caused by Rhytisma ~~salicium~~ + Fries., reported from Minnesota (Aitkin, Fillmore, Itasca, Marshall, Pennington and Roseau Counties, July 19).

Canker caused by Cytospora (Chrysosperma ?) reported from Minnesota (Clearwater Co., July 3).

Leaf blight caused by Cylindrosporium sp. reported from Washington (Whitman Co.).

+ SALICINUM

WITCHHAZEL (Hamamelis virginiana)

Leaf spot caused by Phyllosticta hamamelidis Cook reported from West Virginia (Sturgis City, Rock Forge and Morgantown, July 7).

DISEASES OF ORNAMENTAL PLANTS

AMPELOPSIS sp.

Leaf spot caused by Guignardia bidwellii (E.) V. & R. (Phyllosticta ampelopsidis) reported from New Jersey (range throughout entire state), West Virginia, and Minnesota (Anoka, Ramsey, and Rice Counties, June 21).

Powdery mildew caused by Plasmopara viticola (B. & C.), Berl. & De Ton. reported from New York (New York City, August 9).

Powdery mildew caused by Uncinula necator (Schw.) E. & E. (U. ampelopsidis Peck) reported from West Virginia (found in small amounts on wild plants at Dellslow, Monongalia Co.) and Minnesota (Clay and Polk Counties, Aug. 21).

ASTER, China (Callistephus chinensis)

Septoria leaf spot caused by Septoria callistephi Gloyer, reported from New York. A Septoria leaf spot (Septoria sp.) was also found in Michigan.

Wilt caused by Fusarium conglutinans callistephi reported from New York (generally severe - produced a dwarfing, yellowing and wilting of the plants as well as a failure to flower - period of greatest injury was during July and August), Michigan (Hillsdale, Kalamazoo, and Wayne Counties), and Minnesota (Ramsey and Wabasha Counties, July 16).

Stem rot or wilt caused by Fusarium sp. reported from New Hampshire (Hillsboro Co., Aug. 26), Ohio (Lucas and Erie Counties, Feb. 28), Indiana (Tippecanoe Co. - a limiting factor in aster growing in the state), and Washington (Walla Walla Co.).

Botrytis sp. reported from Connecticut (New London, New London Co., Aug. 13).

Dodder (Cuscuta sp.) reported from New York (Schenectady, Schenectady Co., Aug. 23 - not important).

Yellows, cause undetermined, reported from New Jersey, Pennsylvania (found July 26 at Philadelphia), and West Virginia (Morgantown, Monongalia Co., May 18).

BARBERRY (Berberis sp.)

Rust caused by Puccinia mirabilissima Pk. reported in Washington (Whitman Co.)

Rust caused by Puccinia graminis Pers., reported from Vermont, Rhode Island (species questioned), Tennessee, Michigan (Kent Co), and Minnesota (nine counties throughout southern and southeastern section of state, May 18).

Angular leaf spot, cause bacterial, reported from Washington (Whitman Co.).

BARBERRY, Japanese (Berberis regeliana)

Leaf spot caused by Gloeosporium berberidis Cke. reported from Minnesota (Dakota Co., July 28).

BEGONIA sp.

Root gall caused by Heterodera radicicola (Greef.) Müller present in Ohio.

BOX (Buxus sempervirens)

Macrophoma candollei Berl. and Vogl., reported from New York. (J.F.C.)

CARNATION (Dianthus caryophyllus)

Wilt caused by Fusarium sp. was more prevalent in Ohio than in the past. Earliest report Mar. 25.

Rust caused by Uromyces caryophyllinus (Sch.) Wint. reported from New Jersey (common but not serious) and Ohio (in greenhouse, Cuyahoga, Fairfield, Franklin, and Lucas Counties.

Stem rot caused by Botrytis sp. occurred in Ohio.

Root rot caused by Rhizoctonia sp. was reported from New Jersey as of common occurrence but not serious in extent of damage.

Root knot caused by Heterodera radicicola (Greef.) Müller reported from Texas as unimportant.

CHRYSANTHEMUM (Chrysanthemum hortorum)

Leaf spot caused by Septoria chrysanthemi Cav. (S. chrysanthemella (Cav.) Sacc.) reported from Texas (Navarro Co. - unimportant).

Sooty mold caused by Fumago sp. reported from Texas (Matagorda Co. - unimportant).

Powdery mildew caused by Erysiphe cichoracearum D.C. (Oidium chrysanthemi) reported from Ohio (Wayne Co. - normal prevalence).

A leaf spot, cause undetermined, was reported from Ohio.

CELASTRUS SCANDENS

Leaf spot caused by Ramularia celastri Pk. reported from Minnesota (Wright Co., July 27).

DAHLIA (Dahlia sp.)

Powdery mildew caused by Erysiphe cichoracearum D.C. reported from Ohio (Montgomery Co., Oct. 28 - moist weather conditions were favorable).

DAISY

Leaf spot caused by Cercospora sp. reported from Minnesota (St. Louis Co., Aug. 17).

DELPHINIUM (Delphinium sp.)

Leaf spot caused by Phyllosticta sp. reported from New York (Little Falls, Herkimer Co., July 16).

Powdery mildew caused by Erysiphe sp. reported from New York (Poughkeepsie, Dutchess Co., June 14).

EVONYMUS (Evonymus sp.)

Leaf spot caused by Exosporium concentricum (Heald) Wolf reported from Texas (Bexar, Brazos, Grimes, Harris, and Waller Counties - rather important).

GERANIUM (Geranium sp.)

Gray mold caused by Botrytis cinerea Pers. reported from Ohio (Madison Co., Mar. 29).

Stem rot, cause undetermined, reported from Washington (Grant Co.).

GLADIOLUS (Gladiolus sp.)

Hard rot caused by Septoria gladioli Passer. reported from New York. It is found within the state wherever the gladiolus is extensively grown. All varieties are reported to be susceptible.

GOLDEN GLOW (Rudbeckia laciniata)

Powdery mildew caused by Erysiphe cichoracearum D.C. reported from West Virginia (Monongalia Co).

Rust caused by Uromyces rudbeckiae Arth. & Holw., reported from Minnesota (Becker, Clay, and Goodhue Counties, May 16).

GOLDEN ROD (Solidago spp.)

Rust caused by Coleosporium solidaginis (Schw.) Thüm. reported from Vermont (common during fall months, Sept. 30) and West Virginia (common on several species in Monongalia Co.).

Fust caused by Puccinia asteris Duby, reported from Minnesota (July 30).

HOLLYHOCK (~~Althea~~ Althaea rosea)

Rust caused by Puccinia malvacearum Mont. reported from Vermont (average prevalence - small percent of crop injury - earliest report September 1), New York (severe, found wherever hollyhocks are grown), New Jersey, West Virginia, Iowa, and Washington. Common throughout New York and New Jersey.

Leaf spot caused by Phyllosticta althaeina Sacc. reported from Ohio.

Leaf spot caused by Cercospora althaeina Sacc. reported from Minnesota (Nobles Co., July 16).

Root rot caused by Ozonium omnivorum Shear, reported from Texas (Bell, Dallas, Denton and Kauffman. Counties - found in soils where cotton dies - 2% reduction in yield).

HUCKLEBERRY (Gaylussacia baccata)

Exobasidium vaccinii (Fckl.) Woron. reported from Rhode Island. (J.F.C.)

HYDRANGEA (Hydrangea hortensia)

Rust caused by Pucciniastrum hydrangeae (B. & C.) Arth. reported from West Virginia (abundant in certain localities in vicinity of Morgantown, Monongalia Co.).

IRIS (Iris spp.)

Bulb rot caused by Bacillus car~~a~~otovorus Jones reported from Ohio (found June 10 in Van Wert Co.).

Rhizoctonia caused by Rhizoctonia sp. reported from Washington.

Leaf spot caused by Didymellina iridis (Desm.) Von H. (Heterosporium gracile (Wal.) Sacc.) reported from New York (moderately severe, causing a spotting of the leaf, occurs each year on the Cornell University campus at Ithaca) and Minnesota (Hennepin, Kittson and Ramsey Counties, July 2).

JONQUIL (Narcissus sp.)

Blight caused by Botrytis sp. reported from Washington (King Co.)

LILAC (Syringa spp.)

Powdery mildew caused by Microsphaera alni (Wallr.) Wint. reported from New York (found wherever lilacs are grown), New Jersey (throughout state, abundant but not serious), West Virginia (generally present late in the season around Morgantown, Monongalia Co. - so far not considered important), Ohio (present in Montgomery and Wayne Counties, less prevalent during 1920 - earliest appearance Oct. 28), Minnesota (reported from eleven counties - earliest report July 16), and Iowa (common).

Leaf spot caused by Phyllosticta halstedii E. & E. reported from New Jersey (common).

Leaf spot caused by Cercospora sp. reported from Minnesota (local and unimportant, earliest report Aug. 23 at Arizona).

An interesting case of late flowering was observed and reported by John L. Sheldon of Morgantown, Monongalia Co., West Virginia. A brush pile had been burned near a lilac bush. Blossoms were observed on the fire side of the bush about the middle of October.

MATRIMONY VINE (Lycium sp.)

Downy mildew caused by Microsphaera sp. occurred in Ohio.

MORNING GLORY (Ipomoea spp.)

White rust caused by Albugo ipomoeae-panduranae (Schw.) Sw. (Cystopus convolvulacearum), reported from West Virginia (abundant and destructive to the wild morning glories, near Morgantown, Monongalia Co.), and Georgia (of general range over the state; unimportant during current year, produced leaf and fruit spot or lesions).

PALM (Phoenix sp.)

Smut caused by Graphiola phoenicis (Mong.) Poit. reported from Texas (a trace found - unimportant).

PALM, Date (Phoenix dactylifera)

Leaf spot caused by Exosporium palmivorum Sacc. reported from Texas (Harris Co. - important only when found in the greenhouses).

PEONY (Paeonia officinalis)

Leaf spot caused by Botrytis paeoniae Oud., reported from New York (of little importance), Pennsylvania (Center and Philadelphia Counties, June 12), Ohio (less prevalent), and Minnesota (reports only from southeastern portion of state - Rice Co., June 29). While the weather conditions were favorable to the disease in Pennsylvania it was unfavorable in Ohio where the soil water supply was abundant. Ohio reports no treatment used. In Minnesota the bud and root were mainly attacked.

Cladosporium peoniae Pass. reported from Minnesota (Dakota, Dodge and Wabasha Counties - earliest report from Dakota Co. July 28).

Scab caused by Cladosporium sp. reported from Washington (Whitman Co.).

A questionable mosaic was reported from Michigan.

PERIWINKLE (Vinca sp.)

Rust caused by Puccinia vincae (D.C.) Berk. reported from Michigan (Kent and Muskegon Counties - first report for state).

PHLOX (Phlox sp.)

Leaf spot caused by Cercospora phlagina Peck. reported from Minnesota (Hennepin Co., July 31).

PRIMROSE (Primula spp.)

Gray mold caused by Botrytis cinerea Pers., reported from Ohio (Occurred in greenhouse; percent of crop injury slight - earliest report March - varietal resistance was noted in that P. obconica was not affected while P. malicoides was very susceptible).

PRIVET (Ligustrum vulgare)

Anthracnose caused by Gloeosporium cingulatum Atk. occurred in Texas (Bell Co., unimportant) and Ohio (Knox Co., Apr. 14 - of normal prevalence, the loss being light.)

Leaf spot caused by Exosporium concentricum Heald and Wolf, reported from Texas (Harris Co., neither prevalent nor important within the state).

Root rot caused by Ozonium omnivorum Shear present in Texas (Ellis Co. - serious).

Winter injury caused by low temperature and snow was general in Chio.

Drought breakdown caused by Physiological condition reported from Ohio, (Seneca Co., Oct. 22).

PYROLA (Pyrola rotundifolia)

Melampsoropsis pyrolae II. Arth., reported from Massachusetts. (J.F.C.)

ROSE (Rosa spp.)

Powdery mildew caused by Sphaerotheca pannosa (Wal.) Lev. reported from New York (var. rosae), New Jersey, Pennsylvania, West Virginia, Texas, Arkansas, Ohio, Minnesota, Missouri, Arizona, Idaho, Washington, and Oregon. The disease was of general occurrence in all the states heard from. In Texas and Arkansas it was more severe than in the previous year and in Ohio it was less troublesome. In New Jersey it was very abundant and frequently injurious. Also important in West Virginia, Texas and Oregon. All parts of the plant above ground were reported as being attacked. In New York a curling of the leaf, as well as bud blasting and dwarfing, were found. Moist weather conditions in Texas assisted to bring about a 1% reduction in yield. Although moist conditions prevailed in Minnesota, the cool temperature prevented severe injury. The ramblers and climbers were the most susceptible varieties in New York, Pennsylvania, West Virginia and Oregon, although the Dorothy Perkins was severely attacked in Arizona, as were other varieties in West Virginia growing in the shade.

Dates of appearance:
May - Arkansas
June 14 - Minnesota
June 23 - Ohio
July 22 - West Virginia
September 22 - Arizona

Rust caused by Phragmidium montivagum Arth. was found on Rosa neomexicana in Utah (June 28 Piute Co., Aug. 23 Cache Co., and Sept. 18 in Parleys Canyon), on Rosa puberulenta (July 19 Iron Co., and Aug. 3 Beaver Co.).

Rust caused by Phragmidium rosae-californicae reported from Washington (Whitman Co.) and Phragmidium spp. from New York (was severe in the rose test garden at Ithaca for the first time) and Oregon (general in western part of the state). Phragmidium rosa-setigerae Diet. occurred in Ohio.

Rust caused by Earlea speciosa (Fr.) Arth. reported from Minnesota (Olmstead Co., June 9 - also found in Sherburn, Jackson, Martin, Freeborn and Mower Counties).

Crown gall caused by Bacterium tumefaciens Sm. & Towns. reported as greenhouse trouble from New York and Michigan.

Anthracnose caused by Gloeosporium rosae Hals. reported from Texas (Harrison Co. - unimportant) and Ohio.

Crown canker caused by Cylindrocladium scoparium Morgan reported from New York (reduction in the number of blooms on the Ophelia variety was noticed in a greenhouse at Irondequoit).

Leaf spot caused by Cercospora rosicola Pass. reported from Minnesota Marshall and Dodge Counties, July 26).

Cane blight caused by Coniothyrium fuckelii Sacc. reported from New Jersey (sometimes destructive).

Texas root rot caused by Ozonium omnivorum Shear reported from Texas (Denton, Farrant, Dallas, Bell and Falls Counties - very important when rose plants are grown in black waxy soils - reduction in yield for the state amounted to about 1%.

Nematode, Heterodera sp., was reported from Michigan (Kent Co.).

Winter injury and frost blister caused by meteorological factors reported from Washington. The former occurred in Whitman County, the latter in King and Yakima Counties.

Black spot caused by Diplocarpon rosae Wolf, (~~Actinomena~~ Actinonema rosae Lib.) Fr.) reported from New York, Connecticut, New Jersey, Virginia, West Virginia, Texas, Arkansas, Ohio, Minnesota, Missouri, Washington, Oregon. The disease was of general prevalence in New York, Ohio and along the western portion of Oregon. About 70% of the plants in New York state were affected. In Texas it was very important and more prevalent than in 1919. In West Virginia it was abundant locally. In Arkansas it was quite severe and produced a crop injury of around 10%. The nature of the injury was mostly that of foliage spotting and premature defoliation. In New York the bush varieties were mostly attacked, especially hybrid perennials and hybrid teas. In Connecticut and New Jersey it is primarily a greenhouse trouble. In West Virginia the disease was abundant in shaded localities. In Texas and Ohio favorable moisture conditions existed which allowed the disease to be most prevalent.

Salt injury reported from Michigan (rose plants were affected by salt in the greenhouses located in Saginaw and Wayne Counties).

SUNFLOWER (Helianthus annuus)

Rust caused by Puccinia helianthi Schw. was reported from New York (about Ithaca it was very prevalent - moderately severe in state) and Utah (Zion's Canyon, Washington Co. A.O.G.).

SWEET PEA (Lathyrus odoratus)

Root rot caused by Thielavia basicola (B. & Br.) Zopf. reported from New York (occurred in several houses under glass).

SYRINGA (Philadelphus occidentalis)

Rust caused by Gymnosporangium gracilens (Peck.) Kern and Bethel reported found in Utah (Zion Canyon, Washington Co. - this extends the distribution of this Gymnosporangium about 200 miles westward. A.O.G.)

VIOLET (Viola odorata L.)

Root rot caused by Thielavia basicola (B. & Br.) Zopf. reported from New York (found by two growers who grew them under glass).

DISEASES OF MISCELLANEOUS PLANTS

Allium tricoccum Ait.	Leek, wild
Septoria viridi-tingens Curt.	Leafspot
Minnesota (Goodhue Co., May 1)	
Amaranthus blitoides Wats.	Amaranth
Albugo bliti (Biv.) Kze.	White rust
Minnesota (Clay & Norman Counties, July 7)	
Amaranthus retroflexus L.	Amaranth, green
Albugo bliti (Biv.) Kze.	White rust
Minnesota (Anoka, Clay, Isanti, Kittson, Marshall, Norman, Pennington, Red Lake, Ramsey, Sherburne, & Waseca Counties, June 22)	
Ambrosia ~~artemisiifolia~~ artemisiaefolia L.	Ragweed
Erysiphe cichoracearum DC. (E. ambrosiae Schwein.)	Powdery mildew
Minnesota (September 11)	
Ambrosia trifida L.	Ragweed, great
Erysiphe cichoracearum DC. (E. ambrosiae Schwein.)	Powdery mildew
Minnesota (Kittson, Polk, Rice, Waseca Counties July 22)	
Plasmopara halstedii (Farl.) B. & de T.	Downy mildew
Minnesota (Dakota & Ramsey Counties, May 30)	
Puccinia xanthii Schw.	Rust
Minnesota (Red Lake Co., Aug. 14)	
Amphicarpa monoica (L.) Ell.	Peanut, hog
Synchytrium decipiens Farl.	Blight
Minnesota (Hennepin, Ramsey, Red Lake Counties, May 30)	
Uromyces appendiculatus (Pers.) Lev.	Rust
Minnesota (Isanti Co., July 14)	
Arisaema sp.	Jack in the Pulpit
Uromyces arisaemae Cke.	Rust
Minnesota (Ramsey Co., May 22)	

Astragalus humistratus A. Gray Uromyces punctatus Schrot. Utah (July 19, Iron Co., A.O.G.)	Locoweed Rust
Astragalus sonorae A. Gray Uromyces punctatus Schrot. Utah (July 19, Iron Co. A.O.G.)	Locoweed Rust
Astragalus sp. Uromyces punctatus Schrot. Utah (July 19, Iron Co. A.O.G.)	Locoweed Rust
Bidens frondosa L. Sphaerotheca humuli (DC.) Burr. Minnesota (Clay Co., Sept. 7)	Beggarticks Powdery mildew
Brodiaea douglasii S. Wats. Uromyces brodiaeae Ell. & Hark. I. Utah (June 21, Summit Co. A.O.G.)	Hyacinth, wild Rust
Bursa bursa-pastoris (L.) Weber Albugo candida (Pers.) Roussel. Minnesota (Clay and Norman Counties, July 7)	Shepherds purse White rust
Cannabis sativa (Town.) L. Septoria cannabina Pk. Minnesota (Nobles Co., July 19)	Hemp Leaf spot
Chamaesyce rugulosa (Engelm.) Rydb. Uromyces proeminens (DC.) Pass. (U. euphorbiae Cook & Peck) Utah (Aug. 3, Beaver Co. A.O.G.)	Spurge Rust
Chenopodium ~~Chenodopium~~ album L. Peronospora effusa (Grev.) Rab. Minnesota (Becker, Blue Earth, Kittson, Sherburne, Stevens, Waseca Counties, June 22)	Pigweed Rust
Chrysopsis horrida Rydb. Puccinia grindeliae Peck Utah (July 22, Washington Co. A.O.G.)	Aster, golden Rust
Cirsium arvense (L.) Scop. Albugo tragopogonis (Pers.) Kze. Minnesota (Kittson, Pennington, Red Lake, Roseau, & Sherburne Counties, July 29)	Thistle, Canada White rust
Coffea sp. Corticium salmonicolor B. & Br. Philippine Islands	Coffee Pink disease
Cogswellia sp. Puccinia jonesii Peck Utah (July 17, Iron Co. A.O.G.)	Cous Rust

Convolvulus sepium L. Bindweed, hedge
Puccinia convolvuli (Pers.) Cast. Rust
Minnesota (June 27)

Echinocystis lobata (Michx.) T. & G. Balsam-apple, wild
Plasmopara australis (Speg.) Swing. Downy mildew
Minnesota (Dakota & Ramsey Counties, June 26)

Erigeron canadensis L. Horseweed
Puccinia asteris Duby Rust
Minnesota (July 5)

Erigeron ramosus (Walt.) B.S.P. Fleabane, Daisy
Puccinia asteris Duby Rust
Minnesota (Anoka Co., July 5)

Eriogonum spp. Eriogonum
Uromyces intricatus Cooke Rust
(U. eriogoni Ell. & Hark.)
Utah (Iron and Washington Counties. A.O.G.)

Euphorbia sp. Euphorbia
Uromyces proeminens (DC.) Lev. Rust
(U. euphorbiae Cke. & Pk.)
Minnesota (Anoka, Hennepin & Kittson Counties, June 27)

Geranium maculatum L. Cranesbill, wild
Puccinia polygoni-amphibii Pers. Rust
Minnesota (Anoka, Chisago and Rice Counties, June 5)

Grindelia squarrosa (Pursh.) Dunal Tarweed
Erysiphe cichoracearum DC. Powdery mildew
(E. lamprocarpa Kickx.)
Minnesota (Wadena Co., Sept. 15)

Grossularia inermis (Ryd.) Cov. & Britt. Gooseberry, wild
Melampsora confluens (Pers.) Jackson Rust
(Caeoma confluens (Pers.) Schrot.)
Utah (July 1, Garfield Co. A.O.G.)

Grossularia leptantha (A. Gray) Cov. & Britt. Gooseberry
Cronartium occidentale (Hedge.) Bethel & Hunt Rust
Utah (Aug. 3, Beaver Co. A.O.G.)

Melampsora confluens (Pers.) Jackson Rust
(Caeoma confluens (Pers.) Schrot.
Utah (July 1, Garfield Co. A.O.G.)

Puccinia micrantha D. Griff I. Rust
Utah (Aug. 3, Beaver Co. This collection moves the range of the species at least 200 miles westward (A.O.G.)

Hepatica acutiloba DC. Hepatica
Tranzschelia punctata (Pers.) Arth. Rust
Minnesota (Goodhue Co., May 15.)

Urocystis anemones (Pers.) Wint. Minnesota (Goodhue Co., May 15)	Smut
Hieracium griseum Ryd. Puccinia hieracii (Schum.) Mart. Utah (July 15, Summit Co. A.O.G.)	Hawkweed Rust
Hydrastis canadensis L. Botrytis sp. Connecticut (Middlesex, New London Counties. Found at Mt. Carmel June 2). New York	Golden Seal Stem rot
Mosaic (cause undetermined) Connecticut (a new disease in state - not prevalent)	Mosaic
Hydrophyllum virginianum L. Sphaerotheca humuli var. fuliginea (Schlect.) Lahn. Minnesota (Becker and Benton Counties, July 16)	Waterleaf Powdery mildew
Impatiens pallida Nutt. Ramularia impatientis Pk. Minnesota (Blue Earth Co., June 22)	Touch-Me-Not Leaf spot
Ivesia gordonii (Hook.) T. & G. Phragmidium horkeliae Garrett Utah (Aug. 16, Salt Lake Co. A.O.G.)	Ivesia Rust
Kentrophyta impensa (Sheld.) Ryd. Uromyces punctatus Schrot. Utah (July 17, Iron Co. A.O.G.)	Rust
Lactuca canadensis L. Septoria lactucae Pass. Minnesota (June 1)	Lettuce, wild Leaf spot
Madronella oblongifolia Ryd. Puccinia monardellae Dudley & Thompson II. Utah (July 20, Iron Co. A.O.G.)	Horse-mint, western Rust
Mentha spicata L. Puccinia menthae Pers. II. Utah (July 28, Iron Co., Aug. 20, Cache Co. Not before reported on this host for Utah. A.O.G.)	Mint Rust
Monarda fistulosa L. Puccinia menthae Pers. Minnesota (Clay, Isanti, Red Lake and Rice Counties July 4)	Bergamot, wild Rust
Oenothera biennis L. Erysiphe polygoni DC. (E. communis Grev.) Minnesota (Aitkin, Beltrami Counties, Sept. 15)	Primrose, evening Powdery mildew

Puccinia peckii (De Toni) Kellerm.	Rust
Minnesota (Anoka, Isanti, Roseau Counties, June 1)	
Osmorrhiza sp.	Osmorrhiza
Puccinia osmorrhizae (Pk.) C. & P.	Rust
Minnesota (May 16)	
Panax quinquefolium L.	Ginseng
Septoria sp.	Leaf spot
Minnesota (Sherburne Co. July 2)	
Non-parasitic	"Rust"
Washington (Skagit Co.)	
Undetermined	Rot
Ohio (Tuscarawas Co. June 21)	
Peucedanum graveolens Br. & H.	
Heterosphaeria patella Grev.	Rust
(Sphaeria patella Pers.) (S. penetrans a. patella Tode)	
Minnesota (Wright Co., Aug. 29)	
Physalis sp.	Ground Cherry
Entyloma australe Speg.	
Minnesota (Beltrami, Fillmore, Hennepin, Pipestone and Rice Counties, July 13)	
Plantago major L.	Plantain
Erysiphe cichoracearum DC.	Powdery mildew
(E. lamprocarpa Kickx.)	
Minnesota (Cass, Dakota, Itasca, Kanabec, Marshall, Mille Lacs, Poke, Rice, Roseau, Ramsey, Waseca Counties, June 23).	
Ramularia ~~plantagoinis~~ plantaginis E. & M.	Leaf spot
Minnesota (July 2)	
Polygonatum commutatus (R. & S.) Dietr.	Solomon's Seal
Puccinia sessilis Schneid.	Rust
Minnesota (Anoka & Rice Counties, June 20)	
Polygonum aviculare L.	Knot weed
Cercospora avicularis Wint.	Leaf spot
Minnesota (Anoka and Norman Counties, July 5)	
Erysiphe polygoni DC.	Powdery mildew
Minnesota (Anoka, Clay, Isanti, Kittson, Marshall, Pennington, Ramsey, Red Lake, Roseau and Stevens Counties, June 23).	
Puccinia polygoni amphibii Pers.	Rust
(P. polygoni)	
Minnesota (Pennington Co., June 5)	

Uromyces polygoni (Pers.) Fuckel Minnesota (Beltrami, Red Lake, Rice, Roseau and Waseca Counties, July 20)	Rust
Polygonum convolvulus L. Puccinia polygoni-amphibii Pers. P.polygoni convolvuli DC.) Minnesota (Beltrami, Cass, Itasca, Kanabec, Pennington Counties, Aug. 5).	Bindweed Rust
Polygonum erectum L. Cercospora avicularis Wint. Minnesota (Anoka, Becker, Harman, Isanti, Rice and Roseau Counties, June 20)	 Leaf spot
Erysiphe polygoni DC. Minnesota (Anoka, Beltrami, Kittson, Marshall, Norman, Pennington, Pipestone, Red Lake, Roseau, and Stevens Counties, June 27).	Powdery mildew
Polygonum muhlenbergii (Meisn.) Wats. Puccinia polygoni amphibii Pers. Minnesota (Itasca, Marshall Counties, Aug. 6).	 Rust
Polygonum pennsylvanicum L. Septoria polygonorum Desm. Minnesota (Ramsey Co., July 25)	 Leaf spot
Polygonum persicaria L. Ustilago utriculosa (Nees.) Tul. Minnesota (Itasca, & Pennington Counties, Aug. 6)	Lady's Thumb Smut
Portulaca oleracea L. Albugo ~~portulacens~~ + (DC.) Kze. + portulacae Minnesota (Beltrami Co., Aug. 5)	Purslane, common White rust
Potentilla canadensis L. Frommea obtusa Arth. (Uredo obtusa Strauss.) Minnesota (Anoka Co., June 5)	Cinquefoil Rust
Potentilla pulcherrima Lehm. Phragmidium ivesiae Sydow II, III. (Ph. affine Sydow.) Utah (Aug. 20, Cache Co. A.O.G.)	Cinquefoil Rust
Potentilla sp. Phragmidium potentillae (Pers.) Karst. (P. triarticulatum Farl.) Michigan (Ingram Co.)	Cinquefoil Rust
Ptilocalais tenuifolia Osterhout Puccinia rugosa Billings (P. troximontis Pk.) Utah (June 21, Summit Co. A.O.G.)	 Rust

Radicula palustris (L.) Moench. Albugo candida (Pers.) Roussel. Minnesota (Isanti Co., July 12)	Marsh cress White rust
Ranunculus cymbaria Pursh. Puccinia clematidis (DC.) Lagerh. Utah (June 28, Piute Co., A.O.G.)	Butter cup Rust
Ricinus communis L. Ozonium omnivorum Shear Texas (found throughout state in soils where cotton dies. Ten percent reduction)	Castor bean Root rot
Ribes aureum Pursh. Cronartium occidentale Hedge., Bethel & Hunt Utah (July 29, Iron Co., Aug. 3, Beaver Co., Aug. 6 Millard Co., Aug. 20, Cache Co., Aug. 24, Morgan Co. A.O.G.)	Currant Rust
Ribes cereum Dougl. Coleosporium ribicola (C. & E.) Arth. II Utah (July 17, Iron Co., Aug. 4, Beaver Co. A.O.G.) Cronartium occidentale Hedge, Bethel & Hunt Utah (Aug. 3, Beaver Co. A.O.G.)	Currant Rust
Ribes cynosbati L. Puccinia ribis DC. (P. grossulariae) Minnesota (Anoka, Goodhue, Ramsey, Rice, Scott, Steele Counties, May 15)	Gooseberry, prickly Rust
Ribes gracile Michx. Puccinia ribis DC. (P. grossulariae) Minnesota (Goodhue, Ramsey Counties, May 15)	Gooseberry, European Rust
Ribes floridum L. Her. Puccinia ribis DC. (P. grossulariae) Minnesota (Goodhue & Ramsey Counties, May 16)	Currant (wild black) Rust
Ribes nigrum L. Puccinia ribis DC. (P. grossulariae) Minnesota (Scott Co., Aug. 30)	Currant (black) Rust
oxaycanthoides Ribes ~~oxycanthoides~~ L. Puccinia ribis DC. (P. grossulariae) Minnesota (July 31)	Gooseberry (smooth) Rust
Ribes petiolare Dougl. Melampsora confluens (Pers.) Jackson (Caeoma confluens (Pers.) Schrot.) Utah (Aug. 16, Big Cottonwood Canyon)	Currant Rust

Rubus (strigosus ?) Phragmidium imitans Arth. Utah (July 27, Iron Co. A.O.G.)	Raspberry Rust
Rubus villosus Ait. Gymnoconia interstitialis (Schl.) Lag. Rhode Island (J.F.C.)	Dewberry Rust
Rubus sp. Septoria rubi West. Minnesota (Beltrami Co., Sept. 18)	Black berry (wild) Leaf spot
Rumex paucifolius Nutt. Uromyces fuscatus Arth. Utah (July 15, Summit Co. A.O.G.)	Dock Rust
Saponaria officinalis L. Macrosporium saponariae Pk. Minnesota (Stearns Co., Aug. 10)	Bouncing Bet Leaf spot
Saxifraga pennsylvanica L. Puccinia saxifragae Schlecht. Minnesota (Ramsey Co., May 30)	Saxifrage, swamp Rust
Scrophularia leporella Bickness Septoria scrophulariae Pk. Minnesota (July 3)	Figwort Leaf spot
Shepherdia canadensis Nutt. Aecidium allenii Clinton Utah (July 27, Iron Co. A.O.G.)	Buffalo Berry Rust
Sisymbrium officinale (L.) Scop. Albugo candida (Pers.) Roussel. Minnesota (Becker, Cass and Ramsey Counties, June 23)	Mustard, hedge White rust
Sisymbrium sp. Albugo candida (Pers.) Roussel West Virginia (J.L.S.)	Hedgemustard Blister blight
Smilacina stellata (L.) Desf. Puccinia sessilis Schneid. (Aecidium convallariae) Minnesota (Rice Co., June 30)	False Solomon's Seal Rust
Symphoricarpus occidentalis Hook Microsphaera diffusa Cke. & Pk. (P. symphoricarpi E. C. Howe) Minnesota (Kittson, Wadena Counties, Aug. 24)	Wolfberry Powdery mildew
Symphoricarpus racemosus Michx. Puccinia symphoricarpi Hark (probably) (Aecidium abundant) Oregon (Forest Grove)	Snowberry Rust

Microsphaera diffusa Cke. & Pk.	Powdery mildew
Washington (Whitman Co.)	
Taraxacum officinale Weber	Dandelion
Puccinia taraxaci Plow.	Rust
West Virginia (common at Morgantown, Monongalia Co., J.F.C.)	
Minnesota (reported from 19 counties throughout state, Apr. 29)	
Ramularia taraxaci Karst.	Leaf spot
Minnesota (June 29)	
Sphaerotheca humuli var. fuliginea (Schlect.) Lahn.	Powdery mildew
(S. castagnei)	
Minnesota (Marshall, Ramsey, Waseca Counties, June 23)	
Theobroma cacao L.	Cacao
Corticium salmonicolor B. & Br.	Pink disease
Philippine Islands (serious)	
Tragopogon porrifolius L.	Salsify
Albugo tragopogonis (Pers.) Kze.	White rust
Washington (Whitman Co.)	
Trillium dectinatum (Gray) Gleason	Trillium
Vermicularia peckii Sacc.	Leaf spot
Minnesota (Goodhue Co., May 16)	
Urtica sp.	Nettle
Puccinia urticae Lagerh.	Rust
(Dicaeoma urticae (Shum.) Kunte.)	
Michigan (Ingram Co.	
Minnesota (Goodhue, Hennepin, Ramsey & Washington Counties, May 16)	
Verbena hastata L.	Vervain, blue
Erysiphe cichoracearum DC.	Powdery mildew
(E. verbenae Schwein.)	
Minnesota (Mille Lac and Polk Counties, Oct. 1)	
Vernonia sp.	Ironweed
Coleosporium vernoniae B. & C.	Rust
West Virginia (in vicinity of Morgantown, Monongalia Co.)	
Viola pubescens Ait.	Violet, Downy Yellow
Puccinia violae (Schw.) DC.	Rust
Minnesota (Clay Co., July 13)	
Viola sororia Willd.	Violet
Puccinia violae (Schw.) DC.	Rust
Minnesota (Ramsey Co., May 23)	
Vitis sp.	Grape, wild
Uncinula necator (Schw.) Burr.	Powdery mildew
Minnesota (Hennepin Co., July 3)	

STATUS OF WHITE PINE BLISTER RUST CONTROL IN 1920-21.

(Prepared by S. B. Detwiler, Office of Blister Rust Control)

"Blister rust is present throughout the white pine regions of New England and New York. The disease is to be found on practically every square mile where wild Ribes are found, but the per cent of infected bushes is small, as yet, except in the worst localities. On 330 check plots in New Hampshire and Massachusetts, State crews examined 146,000 wild Ribes in 1920 and report 1.7 per cent of the wild gooseberry bushes and 2.6 per cent of the skunk currant plants as being infected. In sections where pine infection is heavy and producing aeciospores copiously, from 50 to 80 per cent of the wild Ribes are infected. The uninfected and lightly infected bushes are small suppressed plants growing under cover, and frequently, also, bushes growing in dry, exposed situations, where their leaves become thick and leathery and therefore difficult to infect. Of the cultivated Ribes, *R. nigrum* is nearly always heavily infected, *R. americanum*, *R. vulgare*, and *R. grossularia* only occasionally. Heavy infection on the three latter species occurs most frequently on bushes growing in moist, shaded sites, or where there has been heavy production of aeciospores in close proximity. Infection on these species also varies with the seasons, being heavier in wet years.

"Pine infection is increasing rapidly over extensive areas. The infection on 1919 wood, which is just now becoming visible, is so great as to change previous conceptions regarding the rate of pine infection. The wave-like spread of the rust is becoming apparent. The period from 1900 to 1912 may be considered as the period of introduction and dissemination of this disease over wide areas. In 1914 and 1915, and again in 1918 and 1919, rapid increase in general pine infection took place. From now on, aeciospores will be produced so generally and in such great quantity close to Ribes that another and greater wave of pine infection must be expected in the near future. Drouth during late summer and autumn may be expected to retard this overwhelming infection, since evidence is accumulating that shows high humidity as the chief controlling factor in conditions favoring pine infection. In general, the rapidity and severity of pine infection may be considered as being proportional to the Ribes leaf area adjacent to the pines, since this mainly governs the volume of sporidia produced. Species of Ribes also has a bearing, since there is a marked difference in the abundance of telial columns produced on heavily infected leaves of various species. However, all Ribes found in the northeastern states produce a sufficient number of sporidia to cause damage to pine when aeciospores are produced nearby in large quantities. The distance to which Ribes infect pine is governed principally by the size (especially height) of the bushes, degree and character of their screening, and topography, since these appear to be the chief factors in retarding or accelerating the dissemination of the sporidia. York has reported that the sporidia failed to germinate after a period of ten minutes, under seemingly favorable conditions (p. 10 Bulletin 4, American Plant Pest Committee). This is evidently the reason for the short distance to which Ribes ordinarily infect pine. Excluding *Ribes nigrum*, *R. odoratum* and *R. aureum*, white pine can be grown commercially as a rule when separated at least 200 yards from

Ribes. Isolated wild gooseberry bushes have been found around which pine infections centered for a distance of 500 feet. In most cases, the infecting range of wild Ribes does not exceed 100 to 200 feet. The foregoing conclusions are the results of field observations, and do not refer to the scientific investigations on this disease conducted by the Office of Forest Pathology. So far as determined, however, the scientific facts agree with the field observations.

"The degree of pine infection is shown by the accompanying tabulation. This study was made by running compass lines across country, examining all pines on a strip one rod wide. At points where infection was greatest on or adjacent to the compass lines, small square plots were laid off and the data recorded separately.

Strip	Miles	Acres	No. pine examined	Infected with blister rust	No. plots	Acres	No. pine examined	Infected with blister rust
Littleton to Piermont, N.H. (1919)	39.5	79	6,161	12.5%	213	49.1	7,014	51.5%
Wells River to Barnett - Vt. (1919)	28	56	4,002	3.1%	7	1.8	385	6.2%
Lewis to Ausable Forks - N. Y. (1919)	22.9	55.8	10,501	4.9%	13	14.4	12,986	15.8%
Douglas - N. Y. (1919)	5.5	11	1,796	6.8%	3	.75	1,469	32.8%
Ipswich - Mass. (1919)	4.4	8.8	871	5.7%	9	3	637	27.0%
Brunswick to Farmingdale to Woolwich, Me. (1920)	38.5	77	7,046	6.3%	11	2.75	970	14.4%
Totals	138.8	287.6	30,377	7.0%	256	71.85	23,461	27.7%

"Demonstration control work was conducted in 1920 in cooperation with the States where blister rust is present, as in previous years. The results confirm the conclusions reached in 1919, namely, that it is practicable to eradicate wild and cultivated currant and gooseberry bushes as a means of controlling the blister rust. Thus, in the town of Petersham, Mass., Mr. C. C. Perry reports that on 11,426 acres from which 650,076 Ribes bushes were eliminated, there are 7,075 acres of pine (65 per cent of the area in young growth) within the boundaries of this local control area. The cost of clearing the land of Ribes was 39 cents per acre, or 63 cents per acre of exclusive pine growth. The merchantable pine on this area was accurately estimated, and its total value fixed at $241,460. It required an expenditure of 1.85 per cent of the pine value to protect this area for a period of at least five years. The average cost of control in all States was 35 cents per acre in 1920, 54 cents per acre in 1919, and 66 cents in 1918. These figures include the cost of labor, supervision, and transportation of field men. The total cost averaged only 24 cents per acre for 263,005 acres in the New England States in 1920. The efficiency of the crew work was determined by 682 checks on areas totaling approximately 6,000 acres. The results show that an average of 97.2 per cent of the total number of wild currant and gooseberry bushes (containing over 99 per cent of the Ribes leafage) were destroyed by the crews in the first working of the ground. Of these checks, 112 plots totaling 316 acres were gone over four to six times each. The crews destroyed 65,104 bushes (97 per cent) in the first working of these plots, and found only 1,965 bushes in the checks.

"These favorable results are due to systematic work. The methods used are not complicated, although based on scientific principles. Unskilled labor can be taught quickly to do first class work under the direction of an experienced supervisor. The few bushes missed in the first working are small and well covered, as a rule, and therefore not a serious menace for at least five to ten years, when the ground should be gone over again. The owners of cultivated currants and gooseberries have shown a fine spirit of cooperation in destroying their bushes, even when the pines thus protected are on adjacent property. In New Hampshire, out of 2,139 owners of cultivated bushes, only nine claimed compensation from the State. The following table summarizes the work accomplished by the various states in cooperation with the Bureau of Plant Industry.

State	Total acreage white pine growth*	%acreage bearing growth under 20 years*	Value white pine in State	No. acres from which Ribes eradicated. 1917-1920, inc.	Average Ribes per acre	Average cost per acre
Maine	3,000,000	50%	$50,000,000	29,529	22	$0.69
N. H.	2,500,000	90%	50,000,000	456,889	11	.229
Vt.	86,000	28%	4,420,400	17,659	14.5	1.01
Mass.	775,000	38%	58,000,000	48,944	36	.70
R. I.	125,000	80%	1,250,000	84,526	0.8	.184
Conn.	180,000	10%	1,280,000	8,970	15.3	.95
N. Y.	1,500,000	40%	50,000,000	59,588	63.4	2.48
Sub-totals	8,266,000	58%	217,950,400	706,105	14.0	0.494
Wis.	800,000	75%	17,000,000	11,651	73.9	$0.75
Minn.	5,500,000	10%	160,000,000	5,278	69.4	2.79
Totals	14,566,000	46%	394,950,400	723,034	18.4	$0.515
Acreage for which accurate costs not available				213,068		
Total acreage 1917-1920 inc.				936,102		

*Estimated by the State Forester of the respective states.

The first area in New England where currant and gooseberry bushes were uprooted on a large scale to control this disease is located in the town of Lenox, Mass. The work on this area was done in July, 1916. The crews had no previous experience in such work and consequently found and removed only about 75 per cent of the bushes. In 1920, a critical study was made on the Lenox area, which showed that ten times as many pine infections took place in the three years prior to 1916 as occurred in the three years after control work was done. Every pine on plots, covering twelve acres was carefully examined in this study. Many blister rust cankers were cut out of the trees on this area in 1916, but there is no way of determining the number thus destroyed in the study area as records in 1916 were not kept by plots.

"A more definite comparison of the effectiveness of this control work is furnished in a study of an infection area at New Boston, Mass. Infection began in this area in 1911, and at Lenox in 1906. No control work has been done at New Boston, but otherwise conditions are similar to those at Lenox. On this area the amount of pine infection for the three years after 1916 was approximately the same as in the three years before 1916, but for every infection at Lenox since 1916, 22 infections took place at New Boston during the same period, basing the comparison on 10,000 trees in each area. The control methods used at Lenox were greatly inferior to those since developed, yet the work reduced the rate of pine infection to less than one-twentieth of that at New Boston. It is therefore conservative to state that destruction of 75 per cent of the currants and gooseberries has resulted in reducing pine infection at least 90 per cent. Improved methods now insure the removal of over 95 per cent of the bushes in going over the ground once. This should give commercial protection to pine stands for at least five to ten years.

"It should be borne in mind that the blister rust was not found on native pine in the United States under forest conditions until the fall of 1915. The field work in 1916 was devoted to an attempt to eradicate infection in the known areas, and at the same time to scout for the disease. Such Ribes eradication work as was done in 1916 was not well organized because of inexperience and the pressure to cover ground ahead of the disease. When it was realized that the disease could not be prevented from spreading throughout the range of Pinus strobus, serious attention was concentrated on the possibilities of controlling the disease locally. The results of the early work in uprooting Ribes is now becoming fully apparent. The long incubation period of the disease (one known case in New York being 17 years) makes it unsafe to accept present results as absolutely accurate in percentages. However, the majority of the cankers become visible in the third or fourth season after infection takes place. Infection is considered to have taken place on the year's wood on which the center of the canker is located. The writer believes that most of the pines are infected through the needles, and that needles of the season's growth are attacked chiefly. Some infection may take place on needles two, three, four, or even five years old, and for this reason percentages of infection by years may not be entirely exact.

"Fortunately, Ribes eradication on some of the early control areas was thorough, and consequently no infection is showing in 1921 on wood that grew since 1916.

"At Kittery Point, Maine, Ribes were eradicated in 1917 and an average of 15 wild Ribes per acre were destroyed. Ten acres of this area on which pine was most heavily infected from wild and cultivated Ribes, were selected as a study area. In 1917-18, all pines in the area were located on a map by quarter acre plots, and the infection on each tree recorded, and each tree numbered and tagged. In August 1921, four plots representing 10 per cent of the study area were reexamined, and failed to reveal a single infection on wood later than 1916. The Ribes were removed early in the spring of 1917 and no other bushes were found in checks made in 1918, 1919 and 1921. Infection in 1916 and earlier is abundant on pine in the plots, hence the destruction of the Ribes in 1917 must be responsible for completely stopping infection after 1916. It is interesting to note that the four plots rechecked in 1921 contained 612 trees in 1917, of which 363 trees were infected at that time. In 1921 there were only 333 infected trees because the blister rust mycelium in the cankers on 30 trees had died out, due to the death of the branch before the mycelium reached the stem. However, of the 333 infected trees found in 1921, 204 were dead. Although these dead trees were mostly 10 to 20 years old, the loss is compensated to some extent by 146 seedling pines which have seeded in since 1917. None of these seedlings are infected.

"Dr. L. H. Pennington states that in 1918 a considerable amount of Ribes eradication was done north of Lewis, N. Y., on the east side of the road. No pine infections have been found upon growth younger than that of 1917 in the area from which Ribes were removed. Many infections are found upon the 1918 and 1919 growth in the pine on the west side of the road where the Ribes were not eradicated. Also, in the Boulder Cut plantation near Saranac Lake, N. Y., Dr. Pennington has been unable to find any infections on growth younger than 1917, although many cankers are present on 1917 and earlier growth. The Ribes were eradicated in and around this plantation early in the spring of 1918. Dr. H. H. York reports that he has been unable to find a single canker later than 1916 in origin on an infection area at North Conway, N. H., where the Ribes were removed early in 1917. He also examined 250 small pine trees in a $3\frac{1}{4}$ acre swamp where in 1917 more than 16,000 skunk currant bushes were pulled. Not a single canker dating later than 1916 could be found. One hundred and four cankers of 1916 origin or previous thereto were found. In 1918, Dr. York established check plots in this swamp where patches of skunk currant were pulled in 1917. In these plots the skunk currant seedlings in 1918 were so numerous that there were not less than two per square inch. Today $99\frac{1}{2}$ per cent are gone, due to natural death. The few remaining are 2 to 6 inches in height and are so densely covered with red raspberry, sedges, hardhack and other plants that it does not seem possible, in Dr. York's opinion, for the seedling Ribes to become a serious menace to the pine for 5 years, at least, from the present time. The sprouts from root stocks are so densely screened that they have made very little growth, and they too, in most instances, are of little serious concern, with the exception of a few small areas where they should be pulled in 1922. If this is done thoroughly, Dr. York states that he sees no need for a third eradication of Ribes for the succeeding 15 years, with conditions in the swamp continuing as at present. Dr. York also reports no infection after 10,000 Ribes were removed on a 300 acre tract of pine in 1917 and concludes his statement as follows: "Again I wish to state that only eradication of the Ribes will save the pine, and only this will make the growing of white pine possible on a commercial scale in the future. The Ribes can be eradicated at a cost to amply warrant doing this work. What has been done here is sufficient proof."

"Observations made abroad on the susceptibility of sugar pine and western white pine show that these species are as readily attacked and as severely damaged as our eastern white pine, and limber pine is even more susceptible. This fact is of especial significance to the United States. The widespread abundance of wild currants and gooseberries in the Pacific Coast and Rocky Mountain regions, places these valuable western species in an extremely hazardous position today. It is not overstating the case to predict that once the blister rust is permitted to enter into the Far West, it will threaten the future position of these species in the timber markets of the world. According to Mr. W. S. Moir, who investigated blister rust conditions in Norway, Sweden, Denmark, Belgium, France and England in 1920, strict enforcement of the Federal quarantine prohibiting shipment of blister rust host plants west of the Great Plains is essential to the safety of these western forests. State and Federal inspectors have intercepted 310 shipments of blister rust host plants during the past four years, as they entered the West in violation of the quarantine.

"The U. S. Department of Agriculture has entered into cooperative agreements with practically all of the States in the Far West, for the purpose of obtaining concerted action to keep out the blister rust. Quarantine officers of western states are informed of the dangerous character of this disease and realize that the responsibility of preventing introduction of blister rust hosts rests primarily with them. Persistent searching in the five-leaved pine forests of the Rocky Mountain and Pacific Coast regions indicates that the white pine blister rust has not become established west of the Great Plains. (August 31, 1921)"

PRELIMINARY LIST OF PUBLICATIONS ON DISEASES OF FOREST, SHADE AND ORNAMENTAL TREES AND SHRUBS.

Blakeslee & Jarvis. Trees in winter.
The MacMillan Company, New York, 1913.

Clark, W. D. Facts for farmers. The Ext. Ser. of Mass. Agr. Col. Vol. III, No. 10.

Collins, J. Franklin. Tree surgery. Farmers' Bul. 1178, 1920, U. S. Dept. Agr., Washington, D. C.

Corbett, L. C. Pruning. Farmers' Bul. 181, U. S. Dept. Agr., Washington, D. C.

Foster, J. H. and Krausz, Harry B. Tree planting needed in Texas. Bul. 2 of the Agr. & Mech. Col. of Tex., Dept. of For. Jan. 10, 1917 Vol. III, No. 1.

Garcia, Fabian. Shade trees and other ornamentals. New Mexico Agr. Sta. Bul. 47. Mesilla Park, 1903.

Gaskill, Alfred. A shade tree guide.
Hudson Printing Company, Union Hill, 1918.

Gaskill, Alfred. The planting and care of shade trees. New Jersey forest commission.
State Gazette Publishing Company, Trenton.

Gaylord, F. A. State of New York conservation commission division of lands and forests. (Bul. 7 - shade trees).
J. B. Lyon Company, Albany, 1912.

Hansen, N. E. Evergreens for South Dakota. S. Dak. Agr. Expt. Sta. Bul. 102.
Brookings, 1907.

Kennedy, P. Beveridge. Ornamental and shade trees. Nev. Agr. Expt. Sta. Bul. 61.
Reno, 1906.

Metcalf, Haven (pathologist in charge of the laboratory of forest pathology, Bureau of Plant Industry). Rep. from yearbook for 1907, Washington, D. C.

Morris, O. M. Tree culture. Okla. Agr. Expt. Sta. Bul. 86.
Stillwater, 1910.

Nelson, Aven. Shade tree suggestions. Wyo. Agr. Expt. Sta. Bul. 37.
Laramie, 1903.

Nelson, Aven. The winter-killing of trees and shrubs. Wyo. Agr. Expt. Sta. Bul. 15
Laramie, 1893.

Ness, H. Notes on forest and ornamental trees on the grounds of the agricultural and mechanical college of Texas. Tex. Agr. Expt. Sta. Bul. 105.
College Station, 1908.

Parkhurst, H. E. Trees, shrubs and vines.
Charles Scribner's Sons, New York, 1903.

Peets, Elbert. Practical tree repair.
McBride, Nast & Company, New York, 1913.

Secrest, Edmund. Protection for shade trees. Ohio Agr. Expt. Sta. Mo. Bul. Vol. V
No. 6, Wooster.

Shuler, M. R. Trees for northern North Dakota.
Bulletin - Forestry State Normal School, Bottineau.

Solotaroff, William (secretary-treasurer forest park reservation commission).
Shade tree federation of New Jersey.
MacCrellish & Quigley, Trenton, 1919.

Stone, Geo. E. Shade trees,- characteristics, adaptation, diseases and care. Mass. Agr. Expt. Sta. Bul. 170.
Amherst, 1916.

Thornber, W. S. Trees in Washington. Wash. Agr. Expt. Sta. Pop. Bul. 23.
Pullman, 1909 (reprinted 1911).

Thornber, W. S. Forest, shade and ornamental trees in Washington. Wash. Sta. Bul. 90., Pullman, 1909.

------- Seventh annual report of the shade tree commission. Newark, 1910. (N.J.)

------- Bul. of Mass. tree wardens and foresters' association. Vol. II, No. 3.
Harold J. Neald, Worcester (for reprints).